REMARKS

Amendments

Claims 1 and 3 are amended to recite that one of R^1 and R^2 is a cyclic alkyl group of 1 to 20 carbon atoms and the other is hydrogen or a straight, branched or cyclic alkyl group of 1 to 20 carbon atoms, or R^1 and R^2, taken together, may form an aliphatic hydrocarbon ring in which $-CH_2-$ may be substituted with a $-Si(R^8)_2-$ group, and R^3 and R^4 each are independently hydrogen or a straight, branched or cyclic alkyl group of 1 to 20 carbon atom, or R^3 and R^4, taken together, may form an aliphatic hydrocarbon ring in which $-CH_2-$ may be substituted with a $-Si(R^8)_2-$ group. See, e.g., page 6, line 28-page 7, line 14, formulas 10-14, and 17-25 at page 9, and monomers 5-9, and 12-20 at pages 39-40. Claims 2 and 8 are amended to use language in accordance with conventional US practice. New claims 9-20 are directed to further aspects of the invention. See, e.g., page 5, line 13-page 6, line 2, page 14, line 25-page 15, line 11, and the original claims.

Rejection under 35 USC §102(b) in view of Allen et al.

Claims 1-4 are rejected as allegedly being anticipated in view of Allen et al. (US 5,985,524). This rejection is respectfully traversed.

US '524 discloses a chemically-amplified, radiation-sensitive bilayer resist having a top imaging layer and a polymeric organic underlayer. The top imaging layer comprises a radiation-sensitive acid generator, a vinyl polymer or copolymer formed by the polymerization of one or more monomers and includes a monomer selected from acrylate, methacrylate, hydroxystrene (optionally substituted with C.sub.1-6 alkyl), and C_{5-20} cyclic olefin monomers, and a compound having a silylethoxy acid-cleavable group. In the silylethoxy acid-cleavable group, the ethoxy portion can be optionally substituted by C_{1-6} alkyl, phenyl, or benzyl. In accordance with a preferred embodiment, the silicon-containing, acid-cleavable group is bonded to the vinyl polymer. For example, according to one embodiment, the top imaging layer contains an acrylate or methacrylate polymer in which the acid-cleavable, silicon-containing group (e.g., silylethoxy) is attached to the carbonyl group.

US '524 discloses that suitable silicon-containing, acid-cleavable groups are those of the formula $R_1R_2R_3Si\ (CR'_2)_2O$. R' is hydrido, C_{1-6} alkyl, phenyl, or benzyl optionally substituted with C_{1-6} alkyl. R_1, R_2, and R_3 are each independently hydrido, alkyl or $(R_4)_3Si$, in

which R_4 is independently hydrido or lower alkyl.

In example III at column 6, US '524 discloses the synthesis of poly(4-hydroxystyrene-co-2-methacryloxyethyltris(trimethylsilyl)silane. This polymer is then used in example V to form the top layer of a bilayer resist. This top top imaging layer comprises about 95 wt% of the copolymer-poly (4-hydroxystyrene-co-2-methacyloxyethyltris (trimethyl) silane and about 5 wt % of di (tert-butyl) iodonium triflate as a photoacid generator.

In claim 29, US '524 recites a process for generating a bilayer resist image on a substrate wherein an organic underlayer is coated with a top layer comprising a radiation-sensitive acid generator and a copolymer formed from hydroxystyrene monomer optionally substituted with C_{1-6} alkyl, a second monomer selected from the group consisting of acrylic acid and methacrylic acid substituted with an acid-cleavable silylethoxy group. The ethoxy portion of the silylethoxy group is substituted with 0 to 4 C_{1-6} alkyl, phenyl, or benzyl groups, and, optionally, a third monomer optionally substituted with an acid-cleavable group. Claim 30 recites that the second monomer has a specified structure in which R is hydrido or methyl, R' are each independently hydrido, C_{1-6} alkyl, phenyl, or benzyl, R_1, R_2, and R_3 are each independently hydrido, alkyl or, and R_4 is independently hydrido or lower alkyl.

As can be seen from the above discussion, US '524 provides no disclosure or suggestion of a polymer exhibiting a silicon-containing group of the formula $-CR^1R^2-(CR^3R^4)_mSi\ (R^5R^6R^7)$, wherein one of R^1 and R^2 is a cyclic alkyl group or in which R^1 and R^2, taken together, form an aliphatic hydrocarbon ring in which $-CH_2-$ may be substituted with a $-Si(R^8)_2-$ group. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC §102(e) in view of Brock et al.

Claims 1-4 and 8 are rejected as allegedly being anticipated in view of Brock et al. (US 6,444,408). This rejection is respectfully traversed.

In the rejection, reference is made to Example 7 which describes the synthesis of a terpolymer comprising bis(trimethylsilyl)methyl 5-norbornene-2-carboxylate, 2-(2-methyl-4-trimethylsilyl)butyl 5-norbornene-2-carboxylate, and maleic anhydride. Bis(trimethylsilyl)methyl 5-norbornene-2-carboxylate is illustrated in Figure 9 (second formula in top row), and 2-(2-methyl-4-trimethylsilyl)butyl 5-norbornene-2-carboxylate is illustrated in Figure 8 (second formula in bottom row). This polymer is then used in Example 11 as 95 weight percent of a top imaging layer composition. The remaining 5 weight percent

is the photoacid generator, (di(t-butyl) iodonium perfluorooctane sulfonate.

None of the monomers employed in the polymer of Example 7, nor any of the monomers illustrated in Figures 8 and 9 possess or suggest a silicon-containing group of the formula $-CR^1R^2-(CR^3R^4)_mSi\ (R^5R^6R^7)$, wherein one of R^1 and R^2 is a cyclic alkyl group or in which R^1 and R^2, taken together, form an aliphatic hydrocarbon ring in which $-CH_2-$ may be substituted with a $-Si(R^8)_2-$ group. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC §103 in view of Allen et al. and Allen et al. and Choi

Claims 5-8 are rejected as allegedly being obvious in view of Allen et al. (US 5,985,524) taken in combination with Allen et al. (US 5,580,694) and Choi (US 6,045,970). This rejection is respectfully traversed.

The disclosure of US '524 is discussed above. In the rejection, it is asserted that US '694 discloses the use of dissolution inhibitors.

US '694 describes a positive tone, radiation-sensitive composition that comprises a radiation-sensitive acid generator, a substituted androstane, and a copolymer which is the reaction product of (i) acrylic acid, methacrylic acid, or mixtures thereof; and (ii) alkyl methacrylate, alkyl acrylate, or mixtures thereof. The substituted androstane is described as a dissolution inhibitor which gets converted into dissolution enhancer. See, e.g., column 3, lines 18-21.

However, US '694 provides no disclosure or suggestion of a polymer in accordance with applicants' claim 1.

With regards to US '970 the rejection asserts that this reference discloses the use of an organic base in a photoresist composition wherein the "organic base prevents a decrease in a critical size of the pattern after exposure, caused by acid diffusing from an exposed portion of the photoresist to a unexposed portion." The photoresist composition of US '970 includes a polymer of chemical formulae (CF1) or (CF2), a photosensitive acid generator in an amount of from about 1 to 15 weight percent based on the weight of the polymer, and an organic base in an amount of from about 0.01 to 2.0 weight percent based on the weight of the polymer. Triethylamine, triisobutylamine, diethanolamine and triethanolamine are listed as examples of suitable organic bases. Here again, US '970 provides no disclosure or suggestion of a polymer in accordance with applicants' claim 1 or claim 3.

In view of the above remarks, Allen et al. (US '524), taken alone or in combination

with Allen et al. (US '694) and/or Choi (US '970), fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

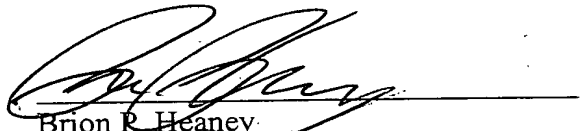
Rejection under 35 USC §103 in view of Brock et al. and Allen et al. and Choi

Claims 5-7 are rejected as allegedly being obvious in view of Brock et al. (US 6,444,408) taken in combination with Allen et al. (US 5,580,694) and Choi (US 6,045,970). This rejection is also respectfully traversed.

As discussed above, none of the monomers employed in the polymer of Example 7 of US '408, nor any of the monomers illustrated in Figures 8 and 9 possess or suggest a silicon-containing group of the formula $-CR^1R^2-(CR^3R^4)_mSi(R^5R^6R^7)$. Furthermore, US '694 provides no disclosure or suggestion of a polymer in accordance with applicants' claim 1. US '970 also provides no disclosure or suggestion of a polymer in accordance with applicants' claim 1.

In view of the above remarks, Brock et al. (US '408), taken alone or in combination with Allen et al. (US '694) and/or Choi (US '970), fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Respectfully submitted,



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